ARM Climate Research Facility

Southern Great Plains Newsletter

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2004 ARM Science Team Meeting Sets Attendance Record

A record-breaking 316 scientists and researchers from 22 different countries attended the 14th ARM Science Team Meeting, held on March 22-26, 2004, in Albuquerque. Attendees participated in poster sessions and plenary groups to exchange findings in the past year. The annual Science Team Meeting provides a forum for evaluating the overall implementation and operation of the ARM Program and its facilities and instrumentation.

The ARM Climate Research Facility, by providing an unmatched source of research data, serves nine U.S. Department of Energy laboratories, a number of private laboratories, more than 30 universities, and 18 international collaborations. The SGP site is an outdoor laboratory that can support guest scientists and their instruments and can host intensive operational periods (IOPs) to gather focused data sets for particular research needs.

Precision Gas Sampling Validation IOP Begins

An IOP planned for March 15–August 20, 2004, will focus on the validation of computer-modeled predictions through comparison with measurements made by the Precision Gas Sampling (PGS) equipment installed at the SGP central facility. This work is being conducted by the ARM/LBNL (Lawrence Berkeley National Laboratory) Carbon Project, whose goals are (1) to measure and track carbon in the environment and (2) to improve predictions of the exchange or flux of carbon, water, and energy between the atmosphere and plants by improving computer models.

Figure 1. ARM technician Pat Dowell makes leaf area index measurements in a wheat field by using a portable sensor (ARM photo).

During the IOP, Carbon Project scientists will deploy two portable flux measurement systems to supplement the daily measurements made at the SGP central facility. The first portable system will reside in a pasture throughout the IOP. The second system will initially be located

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in a wheat field and then will be moved to a field with a summer crop just before the winter wheat harvest. ARM technicians will make measurements of leaf area index (LAI) every other week, as they do for the permanently installed flux systems at the central facility. By using the portable systems to expand the sampling area, researchers will gather information on variations in surface energy exchange processes across the SGP domain.

More detailed discussions of the ARM/LBNL Carbon Project are in the January 2004 issue of this newsletter
(http://www.arm.gov/docs/sites/sgp/news/sgpfacility/jan04.pdf)
and at the Carbon Project's web site
(http://esd.lbl.gov/ARMCarbon).

Wooded Okmulgee Site Generates Crucial Data

Figure 2. The Okmulgee tower (ARM Photo).

Of the 24 developed extended facilities throughout the SGP site, one is unique in its forest location. This facility is at the Okmulgee State Park, five miles west of Okmulgee, Oklahoma.

A top priority of the ARM Program is to obtain measurements in a wide variety of land use conditions over the SGP site. Measurements of surface energy fluxes, temperature, and solar radiation are needed over differing land surfaces, including forest, to represent the vegetation in and around the SGP site accurately. Other extended facilities are located over wheat, pasture, rangeland, alfalfa, and native prairie.

Okmulgee State Park contains 535 acres housing 100 campsites, and 6,436-acre Okmulgee Lake offers recreation such as boating, fishing, and water skiing. Standing inconspicuously in the trees near the park manager's residence is the Okmulgee tower. The site was selected because of its consistent canopy of mixed deciduous trees. Installation of a 60-foot tower proved difficult when the soil was discovered to be only four inches deep, overlying shale bedrock. Workers spent an entire day drilling four deep holes into the shale for anchor mounts secured in concrete to stabilize the tower's four legs. Another day was

needed to assemble and construct the tower, plus additional time for drilling to mount and attach guy wires to secure and stabilize the tower against high winds.

A platform supports the solar infrared radiation station above the treetops at the peak of the tower. Three retractable booms extending from the sides of the tower, about 3 feet below the top platform, hold the eddy correlation system, the surface meteorological observation station, and the downward-facing radiometers. Currently, the top of the tower is 25 feet above the treetops. This configuration will permit useful operation for approximately 10 years before the trees grow too close to the instruments.

Figure 3. A view of Okmulgee Lake from the top of the Okmulgee tower (ARM Photo).

Special precautions were taken to protect the all-aluminum tower and ARM employees from lightning and electrical shock. An air terminal mounted at the top of the tower is grounded at the base. Because traditional grounding rods could not be used in the shale bedrock, large, 4-foot-square copper plates were buried underground, as deep as possible, to dissipate any electrical surges. All of the fiber-optic data cables and the shelter at the base of the tower (which houses the electronic and computer equipment) are isolated from possible electrical damage.

To examine all possible aspects of global climate modeling and to stress the models to their limits, ARM scientists must gather data in many different meteorological and surface conditions. Accomplishing this goal requires the data collected from the wooded Okmulgee site.

To provide more research capability for the global scientific community, the scientific infrastructure and data archive established through the Department of Energy's Atmospheric Radiation Measurement (ARM) Program are now being made available for use by scientists worldwide through the ARM Climate Research Facility.